

CLAIMS

1. A separator system for separating particulates from air flowing in a path comprising two or more separator stages (11, 12, 13) arranged in succession in the direction of flow of air in said path, each stage (11, 12, 13) including a respective housing (22) containing a plurality of side-by-side inertial separators (26) through which said air flows, the additional total pressure drop produced by each separator stage after the first separator stage (12, 13) being less than the additional total pressure drop produced by the preceding separator stage (11) in an upstream direction.
2. A separator system according to claim 1 wherein there are first and second separator stages (11, 12), the total pressure drop across the first and second stages (11, 12) being less than twice the pressure drop across the first stage (11).
3. A separator system according to claim 2 and comprising a third separator stage (13) downstream of the second separator stage (12) in the direction of flow of air in said path, the total pressure drop across the first, second and third separator stages (11, 12, 13) being less than 1.5 times the total pressure drop across the first and second separator stages (11, 12).
4. A separator according to claim 3 and comprising a fourth separator stage downstream of the third separator stage (13) in the direction of flow of air in said path the total pressure drop across the first, second, third and fourth (11, 12, 13) separator stages being less than 1.33 times the total pressure drop across the first, second and third (11, 12, 13) separator stages.
5. A separator system according to any one of claims 1 to 4 wherein each inertial separator (26) includes a vortex generator (31) formed by a helical vane

(32), the pitch of each vane (32) of an upstream stage being greater than the pitch of each vane (32) of a downstream stage.

6. A separator system according to claim 5 wherein the vane pitch is  
5 between 45mm and 33mm.

7. A separator system according to any one of claims 1 to 6 wherein the  
housing (22) of each stage (11, 12, 13) receives a scavenge air flow for  
removing from the housing particulates separated from said air by the stage, the  
10 volume of scavenge air flow supplied to each housing decreasing in a  
downstream direction.

8. A separator system according to claim 7 wherein the scavenge air flow  
decreases by equal amounts between stages (11, 12, 13).  
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9. A separator system according to any one of claims 1 to 8 wherein each  
stage (11, 12, 13) includes a different number of inertial separators (26), the  
number of inertial separators (26) in each stage decreasing in a downstream  
direction.  
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10. A separator system according to claim 9 wherein each stage has, in  
relation to the succeeding stage in a downstream direction, between 5% and  
30% less inertial separators.

25 11. A separator system according to any one of claims 1 to 10 wherein an  
uninterrupted flow path is provided between successive stages (11, 12, 13).

12. A separator system according to any one of claims 1 to 11, and in which  
there are at least three separator stages (11, 12, 13), wherein the spacing  
30 between the stages is equal.

13. A separator system according to any one of claims 1 to 12 and in which there are at least three separator stages (11, 12, 13), wherein the spacing between the separator stages is not equal.

5 14. A separator system according to claim 13 wherein the spacing between separator stages (11, 12, 13) increases in a downstream direction.

15. A separator system according to any one of claims 12 to 14 wherein the spacing between adjacent separator stages (11, 12, 13) is between 6mm and  
10 100mm.

16. A separator system according to any one of claim 1 to 15 wherein a barrier filter (14) is provided downstream of the last stage in the direction of flow of said air in said path.

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17. A separator system according to claim 16 wherein the barrier filter (14) is formed by a depth filter media.

18. A separator system according to any one of claim 1 to 17 wherein the  
20 system removes at least 99.5% of particulates in said air and preferably at least 99.7% of said particulates.

19. An air intake for an engine including a separator system according to any one of claim 1 to 18.

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20. An engine including an air intake according to claim 19.

21. An engine according to claim 20 and including a turbocharger between the air intake and the engine, air flowing from the turbo charger to the engine in  
30 an uninterrupted path.